

CLAIMS

What is claimed is:

1. A laminate comprising:
an ionomer layer;
a backing layer comprising acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof; and
a tie-layer disposed between the ionomer layer and the backing layer.
2. The laminate of claim 1, wherein the ionomer layer comprises a first ionomer layer and a second ionomer layer.

3. The laminate of claim 2, wherein one or both of the first ionomer layer and the second ionomer layer is pigmented, natural, or clear.
4. The laminate of claim 1, wherein the backing layer further comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
5. The laminate of claim 1, wherein the backing layer is multilayered.
6. The laminate of claim 1, wherein the backing layer is a blend.
7. A composite comprising:
an ionomer layer;
a tie-layer; and
a substrate comprising acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polarylate; a polaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding

compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof; and wherein the tie-layer is disposed between the ionomer layer and the substrate.

8. The composite of claim 7, wherein the ionomer layer comprises a first ionomer layer and a second ionomer layer.
9. The composite of claim 8, wherein one or both of the first ionomer layer and the second ionomer layer is pigmented, natural, or clear.
10. The composite of claim 7, wherein the composite further comprises a backing layer.
11. The composite of claim 10, wherein the backing layer further comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
12. The composite of claim 10, wherein the backing layer is a blend.
13. The composite of claim 10, wherein the backing layer is multilayered.
14. The composite of claim 7, wherein the ionomer layer comprises a zinc-neutralized ionomer, a sodium-neutralized ionomer, or a mixture thereof.
15. The composite of claim 7, wherein the thickness of the composite is from 200 μm to 6 mm.

16. The composite of claim 7, wherein the substrate further comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
17. The composite of claim 7, wherein the substrate is a foamed substrate.
18. A composite article comprising, in order:
 - a) an ionomer layer;
 - b) a tie-layer;
 - c) a backing layer;
 - d) a substrate;

wherein at least one of the backing layer and substrate is selected from the group consisting of acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block

copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; blends thereof; and filled blends thereof.

19. The composite article of claim 18, wherein the filled blend comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
20. The composite article of claim 18, wherein the ionomer layer comprises a first ionomer layer and a second ionomer layer.
21. The composite article of claim 20, wherein one or both of the first ionomer layer and the second ionomer layer is pigmented, natural, or clear.
22. The composite article of claim 18, wherein the backing layer comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
23. The composite article of claim 18, wherein the backing layer is a blend.
24. The composite article of claim 18, wherein the backing layer is multilayered.
25. The composite article of claim 18, wherein the ionomer layer comprises a zinc-neutralized ionomer, a sodium-neutralized ionomer, or a mixture thereof.
26. The composite article of claim 18, wherein the thickness of the composite article is from 200 µm to 6 mm.

27. The composite article of claim 7, wherein the substrate is a foamed substrate.
28. A method of forming a composite article comprising:
 - (a) providing a laminate; and
 - (c) securing a substrate to the laminate;wherein the substrate comprises acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof.

29. The method of claim 28, wherein the substrate further comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
30. The method of claim 28, wherein the laminate comprises an ionomer layer comprising a first ionomer layer and a second ionomer layer.
31. The method of claim 30, wherein one or both of the first ionomer layer and the second ionomer layer is pigmented, natural, or clear.
32. The method of claim 30, wherein the ionomer layer comprises a zinc-neutralized ionomer, a sodium-neutralized ionomer, or a mixture thereof.
33. The method of claim 28, wherein the composite article comprises a backing layer.
34. The method of claim 33, wherein the backing layer is multilayered.
35. The method of claim 33, wherein the backing layer is a blend.
36. The method of claim 28, wherein the thickness of the composite article is from 200 μm to 6 mm.
37. The method of claim 28, wherein the substrate is a foamed substrate.
38. The method of claim 28, wherein the laminate is a shaped laminate.
39. A composite article formed by the method comprising:
 - (a) coextruding an ionomer layer and a tie-layer to form a laminate;

- (b) forming a shape from the laminate, resulting in a shaped laminate; and
- (c) securing a substrate material to the shaped laminate; wherein the substrate comprises acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof.

40. The composite article of claim 39, wherein the step of forming comprises thermoforming.

41. The composite article of claim 39, wherein the ionomer layer comprises a first ionomer layer and a second ionomer layer.
42. The composite article of claim 41, wherein one or both of the first ionomer layer and the second ionomer layer is pigmented, natural, or clear.
43. The composite article of claim 39, wherein the laminate further comprises a backing layer.
44. The composite article of claim 43, wherein the backing layer is a blend.
45. The composite article of claim 43, wherein the backing layer is multilayered.
46. The composite article of claim 39, wherein the ionomer layer comprises a zinc-neutralized ionomer, a sodium-neutralized ionomer, or a mixture thereof.
47. The composite article of claim 39, wherein the thickness of the composite article is from 200 µm to 6 mm.
48. The composite article of claim 39, wherein the substrate further comprises glass fibers, carbon fibers, polyaramide fibers, mineral fibers, mica, talc, metal whiskers, or mixtures thereof.
49. The composite article of claim 39, wherein the substrate is a foamed substrate.
50. A vehicle comprising a composite comprising:

an ionomer layer;
a tie-layer; and
a substrate comprising acrylonitrile-ethylene-styrene; acrylonitrile styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof; and
wherein the tie-layer is disposed between the ionomer layer and the substrate.

51. An appliance comprising a composite comprising:
an ionomer layer;
a tie-layer; and
a substrate comprising acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated

butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof; and wherein the tie-layer is disposed between the ionomer layer and the substrate.

52. An automotive part comprising a composite comprising:
an ionomer layer;
a tie-layer; and
a substrate comprising acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber;

polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof; and
wherein the tie-layer is disposed between the ionomer layer and the substrate.

53. A boat hull comprising a composite comprising:
an ionomer layer;
a tie-layer; and
a substrate comprising acrylonitrile-ethylene-styrene; acrylonitrile-styrene-acrylate; an amorphous polyamide; butyl rubber; halogenated butyl rubber; a copolymer of isobutylene and an alkylstyrene; polyisobutylene; a chlorosulfonated polyethylene rubber; a copolyester; a cyclic olefin copolymer; a dynamically vulcanized alloy; a liquid crystal polymer; natural rubber; a general purpose rubber; nitrile rubber; polyacrylonitrile; a polyamide compound that is impact modified with an acid and/or an anhydride containing polymer or rubber; a polyamide elastomer; a polyarylate; a polyaryletherketone; polybenzimidazole; polybutylene terephthalate; polybutylene naphthalate; a polyester

elastomer; polyethylene naphthalate; polyetherketone; polyethersulfone; polyimidesulfone; polymethacrylate-acrylonitrile-butadiene-styrene; polyphenylsulfone; polymethylmethacrylate; polystyrene; a high impact polystyrene; syndiotactic polystyrene; polystyrene maleic anhydride; polyethylene-vinyl alcohol; a sheet molding compound or a crosslinked, glass-reinforced, polyester/polystyrene composition; a bulk molding compound; a crosslinked polyurethane; a reinforced polyurethane; crosslinked dicyclopentadiene; a silicone rubber; a styrene block copolymer; a compression-molded article of woven, glass-fiber-reinforced polypropylene fibers; or mixtures thereof; and wherein the tie-layer is disposed between the ionomer layer and the substrate.